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ABSTRACT

A study-recall paired-associates (PA) learning task was administered to 40 trainable mentally retarded children (6-14 years old) under one of four instructional modeling conditions: imagery, verbal mediation, imagery and verbal mediation, or control. On half of the PA learning study trials, the children were provided with modeled mediating responses (connective pictures and/or sentences) and on the other trials, no model was provided. The children's use of study trial mediating responses was evaluated, as was their recall performance. Each mediation instructional modeling condition resulted in more effective mediator use and recall than the control condition. Verbal mediation training was more effective than instruction in the use of visual imagery. Generation of mediators was most apparent when Ss were first provided with models and then required to generate their own mediating responses. Gains in mediator use and recall were retained over a period of several days. (CL)

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INSTRUCTIONAL TRAINING AND THE DEVELOPMENT OF VISUAL AND VERBAL MEDIATION SKILLS BY TMR CHILDREN

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Instructional Training and the Development of

Visual and Verbal Mediation Skills by TMR Children

Psychologists and educators have long been concerned with the cognitive functioning of mentally retarded children and adults (e.g., Allen, 1973, Haywood, 1970; Robinson and Robinson, 1976) and conceptual problems incurred by this population have been interpreted in many ways. One of the most basic and recurring problems concerns the ability of retarded children and adults to perceive, represent, and deal with various aspects of their environment symbolically, that is, through the use of symbolic mediation processes.

Allen (1969; Allen & Jones, 1967), using a psychometric approach, has indicated that mentally retarded persons incur problems in conceptualizing which result from an impairment of their visual-perceptual ability. Inhelder (1968), employing Piaget's theoretical framework, has interpreted the conceptual problems of the mentally retarded in terms of "primacy of perception." That is, the retarded child or adult seems bound to features of the immediate perceptual environment rather than its more abstract conceptual features. Inhelder and Allen's work leads to the logical conclusion that there is a deficit in the ability of the mentally retarded to employ symbolic processes to represent and deal with meaningful aspects of their environment.

Associative learning theorists, using a somewhat more experimental approach, have identified what they term a "mediation deficiency" on the part of the mentally retarded (Reese, 1962; Goulet, 1968). While normal children and adults are generally able to employ verbal or other modes of symbolic functioning to facilitate performance on learning and memory tasks, the mentally retarded are often

unable to employ symbolic mediation processes in a like manner (Goulet, 1968 p. 116).

Goulet (1968) has indicated that the use of verbal mediation by the mentally retarded may be improved through instruction. Moreover, the influence of instruction on the use of mediation processes by retarded persons has recently been extended to the area of mental imagery (Taylor, Josberger & Knowlton, 1972; Yarmey and Bowen; Zupnick and Meyer, 1975). Zupnick and Meyer's study is of particular significance in that it demonstrated long-term transfer effects as well as the immediate facilitation of associative learning as a function of instruction in the use of mental imagery.

The forementioned studies have important implications for the educational and cognitive development of retarded persons; however, a number of questions remain largely unanswered. One important question concerns the subjects employed in mediated associative learning studies with the retarded. As Goulet (1968) has indicated, most associative learning studies conducted with the mentally retarded have employed adults as subjects and little is known regarding children. Moreover, most studies have employed the educable mentally retarded (EMR's) as subjects and little information is available concerning the associative learning skills of trainable mentally retarded (TMR) children. A second question concerns the nature of symbolic functioning in the retarded. Many studies have investigated the effects of verbal mediation processes on learning and memory performance. Little is known though concerning the comparative development of imaginal and verbal mediation processes in the mentally retarded. It may be that retarded children are deficient in the development of mental imagery as well as verbal mediation processes. It is also possible that imaginal mediation processes may provide an alternative

mode of coding, representing, and organizing the environment for the mentally retarded (Yarmey and Bowen, 1972; Zupnick and Meyer, 1975). If this is the case, it would seem worthwhile to develop concrete imaginal conceptual skills in the mentally retarded -- skills related closely to their immediate perceptual environment -- as well as more abstract conceptual skills of a verbal nature.

A third question concerns the specific factors governing the development of imaginal and verbal mediation processes in the mentally retarded. Previous research has indicated that one method of developing complex cognitive skills in children and adults with learning problems is through the application of modeling techniques (Bandura, 1969). Systematically designed conceptual and language development programs, based on modeling and social learning procedures, have been found to result in the rapid acquisition of learning sets and significant increments in the measured IQ scores of institutionalized retarded children (Bernal, Jacobson, Lopez, & Greeson, 1973; Jacobson, Kellogg, Greeson and Bernal, 1973). Furthermore, Ross, Ross, and Downing (1973) have provided evidence that mediational skills can be developed in EMR children through observational learning. The present study was designed to extend findings concerning modeling and cognitive development to include the development of imaginal and verbal mediation skills in TMR children.

Method

Subjects

Subjects for this study were 40 children enrolled in a public school special education program for the trainable mentally retarded in Atlanta, Georgia. Their mean CA was 11 - 2 with a range extending from 6 - 6 to 14 - 7. The mean IQ of the S's was 48.86 with a range from 34 to 61.

Materials

A paired-associate (PA) learning task was employed, comprised of concrete familiar items chosen from primer level reading books. Item pairs were labeled by the experimenter and presented visually as line drawings on 20.5 X 28 cm. paper. Three practice pairs were used: rabbit-flower, shirt-apple, and balloon-key. The item pairs for the associative learning task were: flag-candle, boat-tree, clock-umbrella, house-ball, and wagon-sun. An item familiarization booklet containing line drawings of the individual items was also constructed in order to give the children an initial experience in naming and drawing the items prior to administration of the associative learning task.

Procedure

The experiment was divided into three parts -- item familiarization, instructional modeling, and associative learning. The item familiaarization period took place prior to instructional modeling and paired-associates learning, and was identical for all of the youngsters. The instructional modeling and paired-associates learning periods were varied systematically according to differences in the experimental conditions to which the children were assigned.

Item Familiarization -- During item familiarization the youngsters were asked to name and draw both practice and PA learning items as they appeared randomly in the item familiarization booklet. If necessary, two naming and drawing trials were administered; this period also provided time for establishing rapport with each child. Responses obtained during item familiarization served as a guide for evaluationg responses obtained during the associative learning task. Item familiarization also served as a method of screening children who were unable to draw and name, or learn how to draw and name, the PA items. Four children were replaced with alternates for this reason.

Instructional Modeling -- During instructional modeling, the practice PA items were presented as a "guessing game" and the children participating were given instructions regarding how to remember which items went together. Each child was told that he/she would be given a "trick for remembering" the item pairs. Children in the imagery-instructional modeling condition were told that they could remember the pairs better by drawing pictures that put the PA items together (e.g., picture of a rabbit holding a flower). Youngsters in the verbal mediation-instructional modeling condition were told that they could remember better by making up sentences putting the items together (e.g., "The rabbit is holding the flower "). Those in the combined imagery and verbal mediating instructional modeling condition were shown how to use both pictures and sentences to help remember the associative learning items. Mediating responses (pictures and/or verbal sentences connecting the PA practice items) were modeled by the experimenter, and youngsters in the appropriate groups were given active practice in generating pictorial and/or syntactical mediators during the instructional modeling period. Control subjects were given rote rehearsal instructions, wherein they were told to name the items and draw them side by side.

Associative learning -- An individually paced study-recall PA learning procedure was employed. PA learning study trials were initiated wherein item pairs were presented pictorially and labeled by the experimenter with the children then being asked to put the items together in pictures and/or sentences depending on the particular condition to which they were assigned. Study trial performance was evaluated on the basis of the number of mediating responses (connective pictures or sentences) generated. During recall, S's were asked to name or draw the correct response items as each stimulus item was presented. Performance was evaluated in terms of the number of correct responses given.

The PA learning task was administered in two five-trial sessions which differed with regard to the presence or absence of instructional modeling during the PA study trials. During one five-trial session, the experimenter modeled mediating responses connecting the item pairs (EM condition) before the youngsters attempted to mediate the item pairs). In the other five-trial session, youngsters were required to generate their own mediating responses (SD condition) without the benefit of a modeled response. All children took part in both EM and SG conditions. Order of presentation was varied with half of the children experiencing the EM conditon prior to the SG condition (EM/SG) and half experiencing the SG condition prior to the EM condition (SG/EM). There was at least a seventy, two hour lapse between the two sessions for each of the children participating in these conditions.

The procedures utilized enabled an analysis of two between and two within groups factors. Between groups factors were instructional modeling (imagery, verbal mediation, imagery and verbal mediation, no modeling) and order of session presentation (EM/SG versus SG/EM). The two within groups factors were experimenter modeled versus subject generated mediators and trials.

Results

Mediator Use

A significant effect of instructional modeling was in evidence for mediator use on the PA study trials ($F=22.85$, $df=3/32$, $p<.001$). As can be noted in Table 1, each instructional modeling condition resulted in more effective mediator use than did the condition without modeling (Newman-Keuls p's $< .05$).

Table 1 also indicates that the verbal mediation condition was considerably more effective in promoting mediation than was the imagery condition. The

difference in the mean number of mediators used under the verbal mediation condition and the combined imagery and verbal mediation condition was not a significant one though. This finding suggests that the addition of instruction in the use of imaginal mediators did not significantly enhance the facilitative effect shown for the verbal condition with regard to mediator use.

Recall Performance

A significant effect of trials was in evidence for recall performance ($F=11.98$, $df= 4/128$, $p < .001$). As expected, a general improvement in recall performance occurred across trial.

Significant main effects of condition (modeling versus generating mediating response) and order of condition presentation were not apparent in the present data. However, a significant condition X order interaction effect was in evidence for recall performance ($F=18.29$, $df=1/32$, $p < .001$).

As can be seen providing S's with experimentally generated mediators prior to requiring than to generate their own mediating responses resulted in substantially more effective recall performance than did requiring them to generate their own mediators prior to providing them with experimentally generated mediating responses.

Retention

In an attempt to evaluate retention, a repeated measures analysis of variance was performed on the youngsters' scores on the last trial of session 1 and the first trial of session 2 of the PA learning task. No significant difference in their performance was in evidence between those trials. Taken in conjunction with the overall trial effect, this is indicative that the children not only learned but also retained the PA items over a period of several days. In

addition, PA mediator use did not change significantly from the end of session 1 to the beginning of session 2. Thus, instructional modeling procedures, as employed in this study, were apparently effective in developing relatively long-term mediational strategies as well as recall performance for the forementioned TMR youngsters.

Discussion

The findings of the investigation provide considerable support for the hypothesis that imagery and verbal mediation used in conjunction with instructional modeling result in effective mediator use and recall facilitation for public school TMR children. Each instructional modeling condition resulted in significantly greater mediator use and recall performance than did the control instruction condition.

In addition, it was found that the verbal mediation condition resulted in substantially more effective mediator use and recall facilitation than did the imagery condition. These findings were somewhat contrary to expectations. It was assumed that TMR children would be functioning on a relatively concrete conceptual level, one that would lend itself more to the generation of mental images (i.e. pictures) than to more abstract mediational responses of a verbal nature. One possible explanation for this finding may be that the children have engaged frequently in language development exercises while the development of imaginal mediation processes has been left somewhat to chance. Another explanation may be that requiring subjects in the imagery condition to draw pictures connecting the PA items may have inhibited recall performance by focusing attention on drawing skills, per se, rather than the task at hand. Whatever the explanation, youngsters employed in the present study demonstrated both verbal and imaginal conceptual skills not generally associated with the stereotyped TMR child.

A second unexpected finding was the lack of significant main effects of either level of task difficulty or order of task difficulty. It was expected that TMR children would be unable to use mediating responses to facilitate recall without the aid of experimenter provided models. However, children who were given a brief period of instructional modeling prior to administration of the associative learning task, demonstrated greater recall than control subjects when mediators were subject-generated as well as when they were provided by the experimenter, regardless of order of trial presentation. Ross, et. al. (1973) have indicated that EMR children may be induced to use associative learning mediation strategies through observational learning as well as through direct instructional training. It appears that both of these factors may have been operating in this study as well.

While neither main effect was significant, a relatively strong order of presentation by source of mediator interaction effect provided support for the contention that order of presentation plays an important role in TMR children's ability to recall mediated PA items. While each order resulted in moderately effective recall on the experimenter provided trials, the EP-SG order was considerably more effective in facilitating recall on the subject generated trials of the PA task. Thus, providing TMR children with concrete models of mediating responses on early trials and requiring them to generate their own mediating responses on later trials was particularly effective in promoting subject generated mediator use.

Theoretically, the present study demonstrated that a social learning conception of the development of imaginal and verbal mediation processes in TMR children is an acceptable one. Also, the present findings provide an indication that TMR children are capable, under appropriate instructional

training conditions, of utilizing complex conceptual skills of an associative learning nature.

Educationally, the present findings support the contention that providing children with models and active practice in the generation and use of mediation processes prior to expecting them to generate their own mediators is a highly effective method of instruction, one that can result in effective mediator use and recall facilitation for TMR children attending public schools.

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Table I

Instructional Modeling Condition	Mediators Used		Correct Recall Responses	
	Mean	SD	Mean	SD
Imagery (I)	27.40	19.45	22.80	15.40
Verbal Mediation (V)	43.10	19.45	32.80	17.30
I and V	42.50	12.96	32.50	14.82
No Modeling	00.00	0.00	16.10	11.69

Means and standard deviations of the number of mediators used and correct recall responses given as a function of instructional modeling.

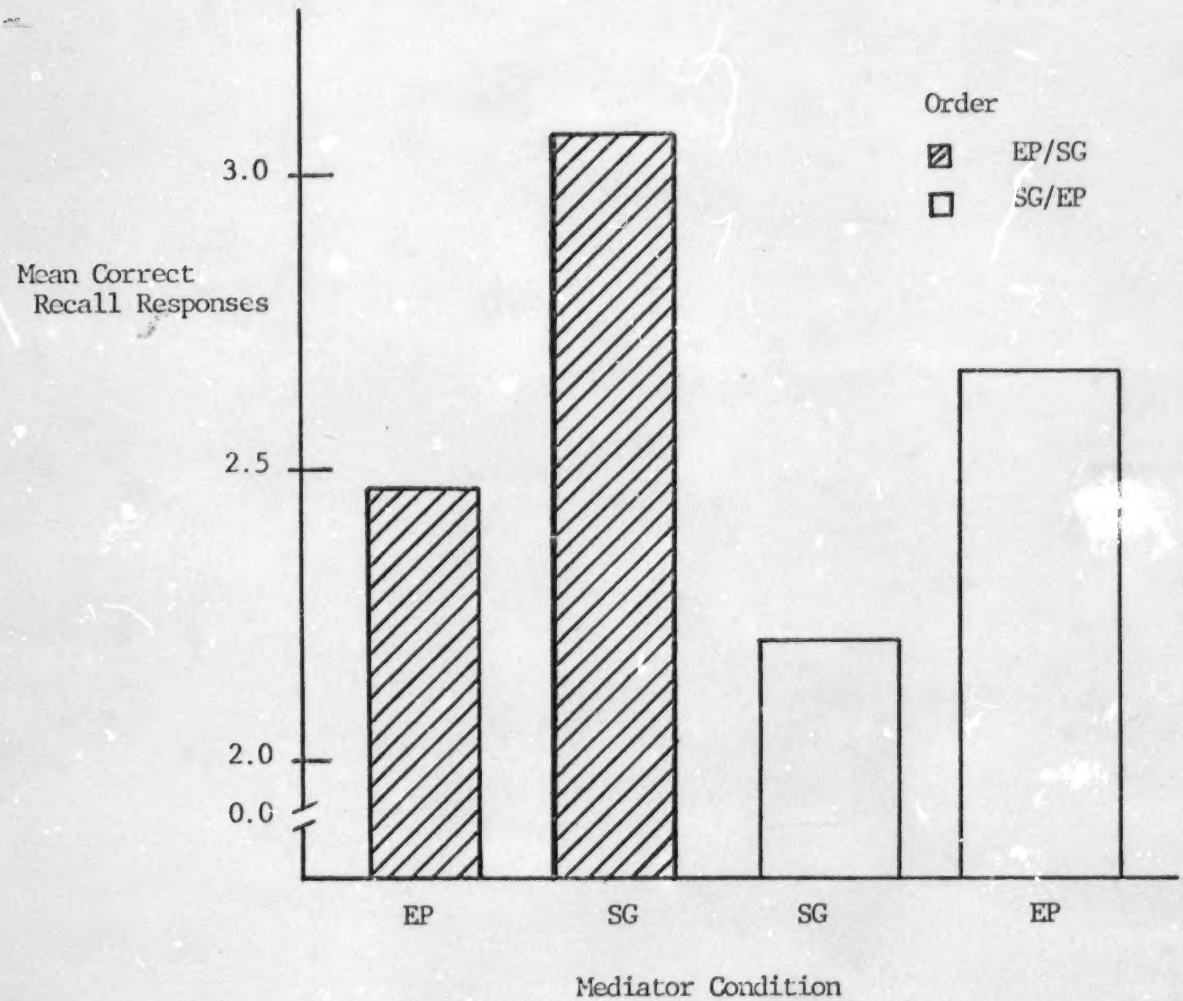

Figure 1. Recall performance as a function of order of session presentation and mediator condition - - experimenter provided (EP) versus subject generated (SG) mediators.